

I. Rejections under 35 U.S.C. § 112, first and second paragraphs

Claims 46-64 stand rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter that was not adequately described in the specification. Claims 46-64 were also rejected under § 112, second paragraph on the ground that it is unclear how the claims read on the disclosed embodiments. Applicants respectfully submit that the pending claims are both clear and adequately supported by the specification.

The present invention is directed to an electrical system, such as an electrical connector, that embodies the I-beam geometry described in the instant specification. The novel I-beam geometry reduces cross-talk between adjacent signal conductors of an electrical connector. Referring to Figure 1, as schematically shown, a connector according to the present invention would generally comprise a conductor (formed, for example, by elements 26 and 28) positioned between first and second spaced-apart ground planes 13 and 15. A first dielectric layer 12 having a predetermined thickness is positioned immediately between the first ground plane 13 and the top edge of the conductor 26/28, and a second dielectric layer 14 is positioned immediately between the second ground plane 15 and the bottom edge of the conductor 26/28. Air occupies the spaces to each side of the conductor 26/28. As further explained in the specification,

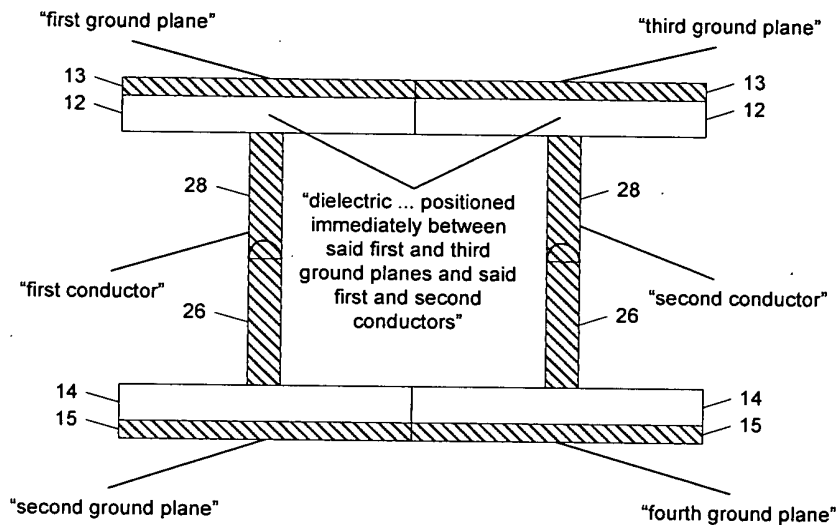
In a connector application, the conductor would be comprised of two sections 26 and 28 which abut end to end or face to face. *The thickness, t_1 and t_2 of the dielectric layers 12 and 14, to first order, controls the characteristic impedance of the transmission line and the aspect ratio of the overall height h to dielectric width w_d controls the electric and magnetic field penetration to an adjacent contact. The aspect ratio to minimize coupling beyond [boundaries] A and B is approximately unity as illustrated in Figure 1.* The lines 30, 32, 34, 36 and 38 in Figure 1 are equipotentials of voltage in the air-dielectric space.

Taking an equipotential line close to one of the ground planes and following it out towards the boundaries A and B, it will be seen that both boundary A or boundary B are very close to the ground potential. *This means that at both boundary A and boundary B we have virtual ground surfaces and if two or more I-beam modules are placed side by side, a virtual ground surface exists*

between the modules and there will be no coupling between the modules. In general, the conductor width w_c and dielectric thickness should be small compared to the dielectric width or module pitch.

Specification, p. 5, ln. 15 – p. 6, ln. 5 (emphasis added).

Independent claims 46, 51, and 56, and their respective dependent claims, are directed to “two or more I-beam modules ... placed side by side,” as described in the portion of the specification excerpted above. The following diagram may be helpful in illustrating how the language of these claims reads on two I-beam modules placed side by side.



In light of the above, Applicants respectfully submit (i) that both Figure 1 and the accompanying description thereof in the portion of the specification excerpted above provide adequate support for the subject matter of these claims and (ii) that it is clear how these claims read on the disclosed embodiments.

Independent claim 61, and its respective dependent claims, are directed generally to the geometry of a single I-beam module. Again, Applicants respectfully submit that both Figure 1 and the accompanying description in the specification provide adequate support for this claim. A comparison of the language used in claim 61 with Figure 1 and its

accompanying description reveals how the language reads on the embodiment illustrated in that Figure.

Applicants disagree with the characterization of Figures 1-3 of the instant application as relating “to theory and not to practical embodiments.” Figures 1-3 are described in the specification as illustrating “preferred embodiment[s] of the connector of the present invention.” The accompanying description refers to structural elements of the connector of the present invention (*e.g.*, “signal conductor,” “dielectric layers,” “ground planes”) and describes their interrelationship. Moreover, the description of the resulting electrical characteristics of the “I-beam” structure, *i.e.*, the generation of virtual ground planes or surfaces between the conductors of two I-beam modules placed side by side, is not fairly characterized as mere “theory.” Indeed, the description explains how the various components of the disclosed connector should be dimensioned relative to one another to produce the desired virtual ground planes.

For the foregoing reasons, reconsideration of the rejections of claims 46-64 under the first and second paragraphs of § 112 is respectfully requested.

II. Rejections under 35 U.S.C. 102(b) and 103(a)

Claims 46-64 stand rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Fedder alone or in view of Seidler, Romine, Kandibowski, Swamy, Teka, Johary and Apap. Claims 46-64 also stand rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Mosquera alone or taken in view of Seidler and Swamy. Finally, claims 46-64 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Korsunsky in view of Mosquera, Seidler, Swamy and Romine.

Essentially, the Office Action asserts that Fedder, Mosquera, and Korsunsky each teach the I-beam structure recited in the independent claims; the secondary references (Seidler, Romine, Kandibowski, Swamy, Teka, Johary and Apap) are relied upon to assert unpatentability of the solder mass features recited in the various dependent claims. Applicants respectfully submit that neither Fedder, Mosquera, Korsunsky, nor any of the secondary references, teaches or suggests the features recited in the independent claims of the instant application.

As discussed above in Section I of this Response, the present invention is directed to an electrical system that embodies the novel “I-beam” geometry described in the instant specification to reduce cross-talk between adjacent signal conductors. As described in the specification and illustrated above, with this geometry, two or more “I-beam modules” can be placed side by side to form an electrical connector. The lateral spacing of adjacent conductors and the spacing between the ends of each conductor and a ground plane (as determined by the thickness of a dielectric that occupies that space) is controlled to form a virtual ground plane or surface between adjacent conductors when signals are carried on them. This virtual ground plane helps to reduce cross-talk between the adjacent conductors.

These features of the invention are reflected in the independent claims of the instant application. For example, independent claim 46 recites an electrical system comprising a first conductor positioned between first and second ground planes (*i.e.*, a first “I-beam module”), a second conductor positioned between third and fourth spaced-apart ground planes (*i.e.*, a second “I-beam module”), and

a dielectric having a predetermined thickness positioned immediately between said first and third ground planes and said first and second conductors;

wherein the predetermined lateral spacing between said first and second conductors and the predetermined dielectric thickness are selected to result in a virtual ground plane between said first and second conductors.

The resulting virtual ground plane helps to reduce cross-talk between the first and second conductors. Independent claims 51 and 56 recite similar features. Independent claim 61 recites similar dimensional relationships in a single “I-beam module,” but omits explicit reference to the dielectric.

None of the cited references teaches or suggests these claimed features. While the references generally describe connectors having signal conductors and ground planes, there is no teaching or suggestion in any of the references of a connector in which the lateral spacing of adjacent conductors and the spacing between the ends of each conductor and a ground plane (as determined by the thickness of a dielectric that occupies that space) is such that a virtual ground plane or surface forms between adjacent conductors when signals are carried on them. Anticipation requires that each feature of a claim be found in a single reference. The Fedder, Mosquera, and Korsunsky references do not provide the relative dimensions of the signal conductors, ground planes and dielectric layers of the connectors described therein, nor the spacings between them. Without such information, it is impossible to conclude that any of these references anticipates the claimed invention.

Nor do any of the cited references, alone or in combination, render the claimed subject matter obvious. None of the references are directed to methods or structures for reducing cross-talk between adjacent signal conductors, let alone doing so by controlling the lateral spacing of adjacent conductors and/or the spacing between the ends of the conductors and a ground plane (as determined by the thickness of a dielectric that occupies that space) to form a virtual ground plane or surface between adjacent conductors. None of these references even comes close to examining the electrical characteristics of a connector at a level sufficient to suggest Applicants claimed invention.

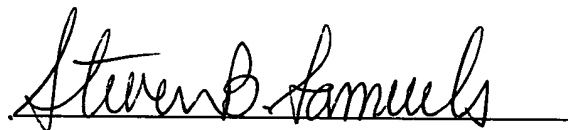
For the foregoing reasons, Applicants respectfully submit that independent claims 46, 51, 56, and 61 patentably define over the references of record. Inasmuch as the remaining claims depend either directly or indirectly from one of these independent claims, Applicants submit that they too patentably define over the references of record for the same reasons. Reconsideration of the § 102(b) and 103(a) rejections of claims 46-64 is therefore respectfully requested.

CONCLUSION

For all the foregoing reasons, Applicants respectfully submit that the present application is in condition for allowance.

Respectfully submitted,

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